



Montana Fish, Wildlife & Parks Crucial Areas Assessment

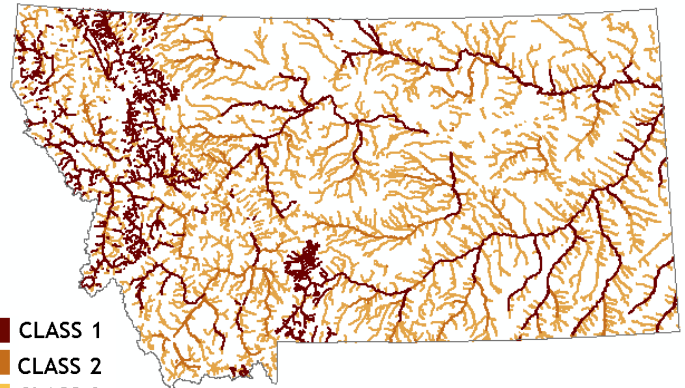


AQUATIC CONNECTIVITY

SUMMARY: The aquatic connectivity layer depicts important stream corridors for fish species that require connected habitats to complete all or a portion of their life history. Corridor importance was determined using an approach that considered corridor size as well as species utilization of known corridors for eight aquatic ecoregions in Montana.

Corridor size was inferred from stream order, a measurement of stream size. Corridor utilization by selected species was determined by selecting a species in each ecoregion that is most sensitive to loss of connected habitats for some or all of its life history needs. These 'focal species' serve as surrogates for preserving high-priority corridors for many other important sport and species of concern. Preserve the corridors and connected habitats for this focal species, and many or most other species will likely benefit.

CLASS 1
CLASS 2
CLASS 3



MEASUREMENT UNIT: River segments, uniquely identified by river mile and latitude/longitude.

DATA SOURCE(S) / QUALITY: The Montana Fisheries Information System (MFISH)

(<http://fwp.mt.gov/fishing/mFish/>) was the source of fish distribution data utilized in this layer. Data within MFISH include Montana Fish, Wildlife & Parks data and collector permit holders from state and federal agencies and non-governmental organizations, 1998 - present. Distribution and abundance data were updated by FWP biologists using this raw survey data.

DATA SOURCES	
<input checked="" type="checkbox"/>	Survey data – counts or estimates
<input checked="" type="checkbox"/>	Survey data – categorical (e.g. presence/absence)
<input checked="" type="checkbox"/>	Expert opinion based on observation
DATA EXTRAPOLATION TECHNIQUE USED	
<input type="checkbox"/>	None
<input type="checkbox"/>	Modeling of habitat-species associations (deductive)
<input checked="" type="checkbox"/>	Statistical modeling (inductive)
<input checked="" type="checkbox"/>	Extrapolation to habitat unit (e.g. stream section)
<input checked="" type="checkbox"/>	Extrapolation based on expert opinion

The Montana FWP Yellowstone cutthroat trout assessment, 2008, was the source of

cutthroat distribution data for streams in the upper Yellowstone aquatic ecoregion. Stream order methodology developed by the National Hydrography Dataset (NHD), 2009.

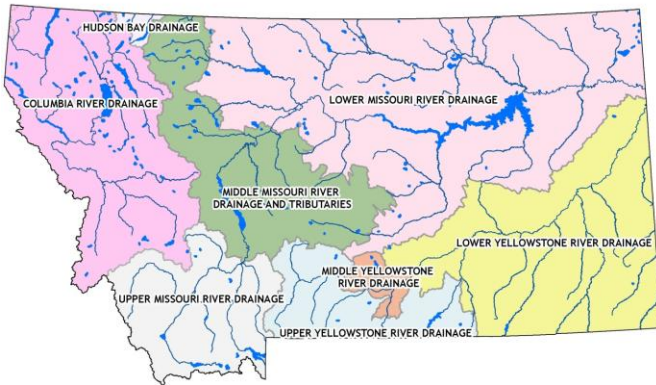
METHODS: We considered aquatic corridors for species within and among eight different aquatic ecoregions within Montana. Eight aquatic ecoregions were delineated based on major drainage area and species composition (warm vs coldwater species). Focal species were selected for each aquatic ecoregion through a ranking process that considered species mobility characteristics (long distance migrations of greater than 10 miles or movement within and among metapopulations) and threat vulnerability (climate change, manmade infrastructure, and habitat alteration). Species selected for each ecoregion were: **sauger** (lower Missouri & lower Yellowstone), **burbot** (middle Missouri &

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middle Yellowstone), **Yellowstone cutthroat Trout** (upper Yellowstone), **bull trout** (Hudson Bay & Columbia), and **Arctic grayling** (upper Missouri). Stream orders were delineated for all streams in Montana using an NHD algorithm. Migratory Yellowstone cutthroat trout are assumed to be present upstream to natural or manmade barriers. Barrier information for Yellowstone streams was obtained from the Yellowstone cutthroat trout assessment, 2008. Stream order methodology developed by the National Hydrography Dataset (NHD), 2009.



Aquatic Ecoregions used to categorize corridors.

FINAL CATEGORIZATION: Stream order (SO) and focal species information were integrated to create a corridor priority system. Four categories were created, representing a gradient, based on current knowledge and past research that suggests increasing corridor importance as SO increases. Highest priority corridors are those habitats where focal species exist, regardless of abundance or SO. High priority corridors are areas where large rivers occur (SO>4), but no focal species are present. Moderate priority streams are moderate size (SO=4 or 3) with no focal species present. Undesignated waters are small streams (SO<3) with no focal species present. We chose not to rank small streams because certain tributaries that connect to large river systems are important and would be undervalued using this rule-based approach for valuing aquatic connectivity.

CLASS	RANGE OF VALUES	RIVER MILES
1	Presence of Focal Species regardless of stream size	9,525 (5%)
2	Stream order ≥ 5 & no focal species present	2,998 (2%)
3	Stream order 3 or 4 & no focal species present	23,904 (13%)
4	Stream order less than 3 & no focal species present	146,768 (80%)

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